

Ajsheron Peninsula - Geology, Structural

Structure of the Ajsheron Ridge. Dokl. AN USSR 85 no. 5, 1952.

Monthly List of Russian Accessions, Library of Congress
December 1951. UNCLASSIFIED.

LEZHNEV, N. N.

Volcanoes in Caspian Sea

"Bark Livenova" and volcano in the Caspian Sea. Dokl. Akad. Nauk SSSR 96 No. 2, 1952

Monthly List of Russian Accessions, Library of Congress, December 1952. Unclassified.

Solov'yev, V. F.

USSR/ Geology - Rock formation

Card 1/1 Pub. #6 - 10/19

Authors : Solov'yev, V. F.

Title : Relief and structure of Apsheron rock

Periodical : Izv. AN SSSR. Ser. geol. 5, 127 - 138, Sep - Oct 1954

Abstract : In the article the facts concerning the relief and geological structure of the submerged barrier separating the central and southern basins of the Caspian Sea are explained. The author considers the Apsheron rock as a combination of three structural elements: the sinking of the Tertiary folding of southeastern Caucasus, the sinking of the folding of the West-Turkmen depression and structures of the Krasnovodsk peninsula-Faerozoic platform with a younger covering. Ten Soviet references (1934 - 1952). Drawings; maps.

Institution:

Submitted: January 29 1953

SOLOV'EV V. F.

USSR/ Geology - Soil composition

Card 1/1 : Pub. 86 - 17/40

Authors : Solov'ev, V. F.

Title : Limy encrustations on the shore of the gulf of Kara-Bogaz-Gol

Periodical : Priroda 43/4, 89-91, Apr 1954

Abstract : An account is given of observations made on the shores of the gulf of Kara-Bogaz-Gol from which it was learned that this body of water has a lower level than the Caspian sea from which it is fed, and has a constantly receding shore line, on which flexible paperlike encrustations appear that consist mainly of calcium carbonate but contain several layers that act as a binder. A theory is presented on the movement of particles of various elements which results in the formation of this encrustation. Illustrations.

Institution :

Submitted :

USSR/Geology

Card 1/1

Authors : Solov'ev, V. F. and Kulakova, L. S.

Title : Under-water mud volcano, "Banka mud, volcano" in the Caspian Sea.

Periodical : Dokl. AN SSSR, 95, 6, 1293 - 1296, 21 Apr 54

Abstract : The article tells about the Ogurchinskiy island and underwater mud pots located in the southeastern part of the Caspian Sea. The mud pots are active volcanos. They erupt hydrocarbonic gases every 15 - 20 minutes, the eruptions usually last 15 minutes. A mud pot called "Banka mud (gryazevoy) volcano", besides hydrocarbonic gases, erupts yellowish mud and pebbles permeating the air with a petroleum odor. The article contains a table which gives the chemical contents of pebbles erupted by the "Banka mud volcano".

Institution : Inst. of Geolog. Scs. of the Acad. of Scs of the USSR.

Submitted : 15 Feb 54

SOLOV'IEV, V.F.

Formation of red colored strata of the west Turkmen depression.
Dokl. AN SSSR 96 no.1:167-170 My '54. (MLRA 7:5)

1. Institut geologicheskikh nauk Akademii nauk SSSR.
Predstavлено академиком D.I. Shcherbakovym.
(Turkmenistan--Geology, Stratigraphic)
(Geology, Stratigraphic--Turkmenistan)

SOLOV'YEV, V.F.

Tectonic chart of the underwater slope of the southeastern shores of the Caspian Sea. Dokl. AN SSSR 96 no.3:605-608 My '54. (MLRA 7:6)

1. Institut geologicheskikh nauk Akademii nauk SSSR.
Predstavлено академиком Н.С.Шатским.

(Geology, Structural--Caspian Sea) (Caspian Sea--Geology,
Structural)

Solov'yev, V. F.

USER/ Geology - Caucasus

Card 1/1 Pub. 46 - 7/21

Authors : Khain, V. Ye.; Sherdanov, A. N.; Solov'yev, V. F.; and
Grigor'yants, B. V.

Title : The tectonic position of the Apsheron peninsula in the system
of Greater Caucasia

Periodical : Izv. AN SSSR. Ser. geol. 1, 80-92, Jan-Feb 1955

Abstract : Basing their considerations on the comparison of already known
new factual geological material obtained in recent years, the
authors analyze the question of the tectonic position of the Apsheron
peninsula in the system of Greater Caucasia and arrive at the
conclusion that it lies within the limits of the eastern boundary
of the zone of the southern slope of Greater Caucasia. Eighteen
references: 17 USSR and 1 German (1864-1953). Maps.

Institution :

Submitted : February 17, 1954

Solov'yov, V. F.

USER/Geology - Tectonics

Card 1/1 Pub. 22 - 42/54

Authors : Solov'yov, V. F., and Skornyakova, N. S.

Title : Tectonic scheme of the underwater dip of the western shore of the central part of the Caspian Sea

Periodical : Dok. AN SSSR 102/5, 1009-1012, June 11, 1955

Abstract : Geological data are presented regarding the tectonic structure of the underwater depression in the western shore line of the central Caspian Sea. Seven USSR references (1934-1954). Drawing.

Institution :

Presented by : Academician N. S. Shatskiy, January 19, 1955

SOLOV'YEV, V. F.

KLENNOVA, M. V. prof.; SOLOV'YEV, V. F.; ARTYUNOVA, N. M.; POPOV, P. O.; YASTREBOVA, L. A.; Baturin, V. P.; KOPYLOVA, Ye. I.; TEGDOROVICH, G. I., redaktor; TOPCHIYEV, A. V., akademik, redaktor; MIRONOV, S. I., akademik, redaktor; ALIYEV, M. M., redaktor; AKHMDZHOV, G. A., redaktor; VARENTSOV, M. I., redaktor; DMITRIYEV, Ye. Ya., redaktor; DOLGOPOLOV, N. N., redaktor; IL'IN, A. A., redaktor; MIRKHTIYEV, Sh. F., redaktor; MOZESON, D. L., redaktor; PUSTOVALOV, L. V., redaktor; FOMIN, A. V., redaktor; NOSOV, G. I., redaktor; KISELEV, A. A., tekhnicheskiy redaktor

[Recent sediments of the Caspian Sea] Sovremennoye osadki Kaspiiskogo moria; Moskva, Izd-vo Akademii nauk SSSR, 1956. 302 p. (MLR 9:3)

1. Deystvitel'nyy chlen AN AzSSR (for Aliyev) 2. Chlen-korrespondent AN SSSR. (for Varentsov, Pustovalov) 3. Nachal'nik morskogo otryada Azerbaydzhanskoy neftyanoy ekspeditsii SOPS AN SSSR (for Klenova) (Caspian Sea)

15-57-7-9295

Translation from: Referativnyy zhurnal, Geologiya, 1957, Nr 7,
p 77 (USSR)

AUTHOR: Solov'yev, V. F.

TITLE: The Chemical Composition of the Sediments in the
Apsheron Region (Khimicheskiy sostav osadkov Priapshe-
ronskogo rayona)

PERIODICAL: Dokl. AN AzSSR, 1956, Vol 12, Nr 10, pp 709-715
(Summary in Azerbaijani)

ABSTRACT: The Apsheron region embraces a shallow-water belt, up
to 25 km wide, adjacent to the Apsheron Peninsula in
the Caspian Sea. The recent sediments of this region
are muds, sandy muds, muddy sands, and sands, according
to the classification of M. V. Klenovaya, Byul. Gos.
okeanogr. in-ta, Moscow-Leningrad, 1951. A crust of
cementation and a layer of coquina are also widely
developed in this region. The chemical composition of
the sediments changes from north to south, from the
region where the Pliocene bedrock is being decomposed
and disintegrated to the region where sediment is

Card 1/2

SOLOV'YEV, V.F.

Naruzhnye Kamni Islands in the Caspian Sea and their place in the
Tertiary monocline of the Azerbaijan-Caspian Sea region. Dokl. AN
Azerb. SSR 12 no.11:855-860 '56. (MIRA 10:3)

1. Institut geologicheskikh nauk AM SSSR. Predstavлено akademikom
AN Azerbaydzhanskoy SSR M.A. Kashkayen.
(Caspian Sea region--Geology, Stratigraphic)

SOV-26-58-8-14/51

AUTHORS: Solov'yev, V.P., Kulakova, L.S., Agapova, G.V.

TITLE: Mountain Ranges on the Bottom of the South Caspian Sea (Gor-nyye khrebyt na dneyuzhnogo Kaspiya)

PERIODICAL: Priroda, 1958, Nr 8, pp 80-82 (USSR)

ABSTRACT: In the last few years soundings in the Caspian Sea have shown that the existing conception of the Southern Caspian Sea Basin as a flat bowl is not correct. The measurements were made by the expedition ships "Professor Soldatov", "Morskoy Geolog" (Sea Geologist), and by the hydrography ship "Sekstan". A profile has been worked out with a horizontal scale of 1 : 200,000 and a vertical scale of 1 : 100. In Figures 1 and 2, two typical profiles of the area are shown. The morphology of the continental shelf is very pronounced. Its average depth in the west is 75 m, in the east 110 m. A series of mountain ranges on the bottom of the sea has been detected alternating with depressions. In the west there are 4 ranges attaining altitudes of 200 - 500 m above the bottom. In the east there is 1 range with ridges of 250 - 400 m above the bottom. The eastern part of the South Caspian Sea is sinking in comparison to the western part. The

Card 1/2

SOV-26-58-8-14/51

Mountain Ranges on the Bottom of the South Caspian Sea

central part of the area is sinking in comparison with the northern section of the Apsheron threshold and the southern section of the Elburs ridge.

There is 1 map and 1 diagram.

ASSOCIATION: Kompleksnaya yuzhnaya geologicheskaya ekspeditsiya Akademii nauk SSSR (Complex Southern Geological Expedition of the USSR Academy of Sciences)

1. Caspian Sea 2. Geology-Caspian Sea

Card 2/2

5 (3)

AUTHORS:

Solov'yev, V. F., Kulakova, L. S.,
Agapova, G. V.

SOV/20-129-5-46/64

TITLE:

Recent Data on the Tectonic Structure of the Bottom of the
South Caspian Sea ✓

PERIODICAL:

Doklady Akademii nauk SSSR, 1959, Vol 129, Nr 5, pp 1126-1129
(USSR)

ABSTRACT:

The deeper places of the southern Caspian Sea have hitherto been insufficiently investigated. In the course of past 2 or 3 years profiles of the bottom relief (Fig 2) as well as a bathymetric and tectonic scheme (Fig 3) could be constructed by means of self-writing sonic altimeters in these places. Thereby an extremely complicated structure of the bottom and new hitherto completely unknown data were detected. Table 1 characterizes the relief of the shelf and of the slope. V. L. Pisachenko took part in the work. (1) The shelf breadth differs from the shelf-ice belt at the western- and at the eastern shore. The shelf-ice belt is in the west close to the shore, the distance is approximately 43 km; in the east approximately 130 km. (2) The depth of the shelf-ice belt fluctuates between 23 and 158 m. In the west it is lower (85 m),

Card 1/4

Recent Data on the Tectonic Structure of the Bottom of the South Caspian Sea SOV/20-129-5-46/64

in the east greater (121 m). The reason for this difference is a more intensive sinking of the eastern part. (3) The lowest depth of the shelf-ice belt corresponds to the anticlinal elevations of the sea bottom, the greatest depth to the synclinal depressions. The depth of the course of the shelf-ice belt may to a certain extent serve as a criterion of the recent tectonic movements (Ref 11). (4) The depth of the shelf-ice belt decreases in the direction of the Apskeron rise and the El'burz mountains and increases in the central part of the southern Caspian Sea. This proves that the two first mentioned regions are more intensively elevated than the middle part of the southern Caspian Sea. On the bottom of the southern part an entire system of submeridionally proceeding 400-500 m high subaqueous mountain chains was discovered. Figures 1 and 2 show that the relief and thus the tectonic structure of the western and eastern part of the southern Caspian Sea differ sharply. This proves a different geological character of these two parts. In the west there are narrow, extended, and so to speak compact elevations and depressions; in the east there are undisturbed, not steep,

Card 2/4

Recent Data on the Tectonic Structure of the Bottom of the South Caspian Sea SOV/20-129-5-46/64

and blurred relief forms. All relief forms are very weakly marked on the shelf. Shelf is nothing else than an abrasion-accumulative plain of intracontinental waters. The sedimentation is most intensive here and levels the relief. The authors present the following total picture of the bottom: the structures of the anticlinorium of the Apsheron archipelago in the west and the structures of the tectonic main line of the Pribalkhanskaya depression in the east collide approximately in the central part of the Apsheron rise. A series of tectonic lines on the mainland as well as in the coastal zone of the sea branch off from the two mentioned structures. Toward the south their direction becomes more and more submeridional. Since no data are available on the southernmost part of the Caspian Sea the authors assume a possible addition of the mentioned structures to the system of the El'burs (2 variants). They thank A. L. Yanshin, Academician, for valuable comments on their work. There are 3 figures, 1 table, and 12 Soviet references.

Card 3/4

Recent Data on the Tectonic Structure of the Bottom of SOV/20-129-5-46/64
the South Caspian Sea

ASSOCIATION: Institut geologii i razrabotki goryuchikh iskopayemykh Akademii
nauk SSSR (Institute of Geology and Mining of Mineral
Fuels of the Academy of Sciences, USSR)

PRESENTED: June 13, 1959, by N. S. Shatskiy, Academician

SUBMITTED: June 12, 1959

Card 4/4

PLATE 1 BOOK EXPLORATION

Sov/5/11

International Geological Congress. 21st, Copenhagen, 1960.

Marine geology (Marine Geology) [Kiev, Izd-vo Ak. SSSR, 1960. 205 p., 2,500 copies printed.] (Series: Geological investigation geology, problem 10)

Editorial Board: P. L. Bernsouw, Rep. Ed.; A. V. Miltsev, V. P. Zonovitch and G. B. Vol'skii; Ed. of Publishing House: V. S. Shpurenko; Tech. Ed.: V. Karpov.

PURPOSE: This book is intended for geologists and economists.

CONTENTS: The book contains 18 articles representing the reports given by Soviet geologists at the 21st International Geological Congress. Individual articles deal with the bottom topography, sedimentation, and tectonics of oceans (Western Pacific and Southern Indian), as well as the hydrogeology and tectonics of the Black and Caspian Seas and Soviet sectors of the Baltic. An English report accompanies each article. No personalities

Author: M. M. Kiselev, V. P. Miltsev, G. B. Vol'skii, I. P. Andreev, A. V. Zonovitch, and V. I. Miltsev. Results of Seismic-geocoustic Investigations of the Lithosphere Under Seas and Oceans

35

Sediments. Dr. N. Strigraphy of Sediments and the Paleogeography of the Northwestern Pacific and the Far Eastern Seas of the USSR According to Seabottom Formations

59

Matrosov, A. P. Formation of Sediments in the Southern Pacific and Indian Oceans

69

Leplin, L. M. and M. A. Belov. Bottom Sedimentation Conditions in the Arctic Ocean

83

Postnikova, V. P. and Th. F. Reprochnov. Bottom Geomorphology and Tectonic Problems of the Black Sea

93

Kolosov, I. I., Yu. S. Polubotok, and G. V. Popov. Relief and Hydrogeological Structure of the Southern Caspian Sea

105

Cernovoroch, D. D. Recent Shallow Deposits in the Marginal Seas of Northeast Asia

115

Elezov, M. V. The Geology of the Barents Sea

123

Gorbushova, T. I. Sediments in the Norwegian Sea

132

Indukhina, N. V. Study of the Diagenesis of Some Marine Sediments

140

Zenkovitch, V. P., O. K. Leont'ev, and Ye. M. Kerevskiy. The Influence of the Continental-Offshore Transition on the Development of the Coastal Zone of Soviet Seas

151

Akhilesov, M. A., V. I. Polozov, and V. P. Zenkovitch. Some New Data on Sediment Streams Along Shores

161

Rudanov, V. I., A. S. Kulin, P. A. Kepin, and V. S. Vaynshteyn. Recent Vertical Movements of Seashores in the Soviet Union

175

Ivantsov, O. K. Types and Formation of Lagoons on Recent Seashores

188

Cart-49.

SOLOV'YEV, V.F.; KULAKOVA, L.S.; AGAPUVA, G.V.

Modern tectonic structure of the bottom of the southern Caspian Sea.
Izv. AN SSSR. Ser. geol. 25 no.4:7-15 Ap '60. (MIRA 13:11)

1. Institut geologii i razrabotki goryuchikh iskopayemykh AN SSSR,
Moskva. (Caspian Sea--Submarine geology)

SOLOV'YEV, V.P., kand.geol.-min.nauk

Search for "big oil." Nauka i zhishn' 27 no.2:22-27
1960. (MIRA 13:6)

1. Uchenyy sekretar' Otdeleniya geologo-geograficheskikh nauk
AN SSSR.
(Petroleum) (Gas, Natural)

SOLOV'YEV, V.F.; MAYEV, Ye.G.; YUNOV, A.Yu.

Manifestations of mud volcanism in the deep section of the southern Caspian. Dokl. AN SSSR 140 no.5:1163-1166 O '61.
(MIRA 15:2)

1. Institut geologii i razrabotki goryuchikh iskopayemykh
AN SSSR. Predstavлено академиком D.I.Scherbakovym.
(Caspian Sea--mud volcanoes)

KLENOVA, Mariya Vasil'yevna; SOLOV'YEV, Vladimir Filippovich;
ALEKSINA, Iya Aleksandrovna; VIKHREJKO, Nina Makarovna;
KULAKOVA, Lidiya Sergeyevna; MAYEV, Yegor Georgiyevich;
RIKHTER, Vladislav Gavrilovich; SKORNYAKOVA, Nadezhda
Sergeyevna; ZENKOVICH, V.P., otv. red.; LEONT'YEV, O.K.,
red. izd-va; IADYCHUK, L.P., red. izd-va; GUS'KOVA, O.M.,
tekhn. red.

[Geology of the subsurface slope of the Caspian Sea]Geolo-
gicheskoe stroenie podvodnogo sklona Kaspiiskogo moria.
[By] M.V.Klenova i dr. Moskva, Izd-vo Akad. nauk SSSR,
1962. 636 p. (MIRA 15:9)

(Caspian Sea--Geology)
(Caspian Depression--Geology)

SHCHERBAKOV, D. I., akademik; SOLOV'YEV, V. P.

Decision of the Bureau of the Department of Geological and Geographical Sciences of the Academy of Sciences of the U.S.S.R. on the results of the 11th Session of the Commission on the Determination of the Absolute Age of Geological Formations. Izv. AN Kazakh.SSR. Ser. geol. no. 5:113-114 '62. (MIRA 15:12)

1. Akademik-sekretar' Otdeleniya geologo-geograficheskikh nauk AN SSSR (for Shcherbakov). 2. Uchenyy sekretar' Otdeleniya geologo-geograficheskikh nauk AN SSSR (for Solov'yev).
(Geological time)

LOGVINGENKO, P.I., kand. med. nauk; SOLOV'YEV, V.P.; POPOV'YANTS, R.S.

Use of potentiated anesthesia. Vest. khir. 82 no. 6:109-114 Ja '59.
(MIRA 12:8)

1. Iz N-okogo voyennogo gospitalya.
(ANESTHESIA) (AUTONOMIC DRUGS)

ZHURAVLEV, Yo.K.; SOLOV'YEV, V.F.

Best efficiency promoter of the Automatic Control and Measuring
Equipment Design Department. Metallurg 8 no.6:35-36 Je '63.
(MIRA 16:7)

1. Chelyabinskiy metallurgicheskiy zavod.
(Chelyabinsk--Iron and steel plants)
(Automatic control)

SOKOLOV'YEV, Vladimir Georgiyevich; PANARIN, Mikhail Mikhaylovich

[Collective labor agreements at enterprises] Kollektivnyi
dogovor na predpriatii. Moskva, Profizdat, 1959. 78 p.
(MIRA 14:4)

(Collective labor agreements)

KOZLOV, Mikhail Rodionovich; PANARIN, Mikhail Mikhaylovich; SOLOV'YEV,
Vladimir Georgiyevich; POPOV, A.S., red.; ANDRYEVA, L.S.,
tekhn. red.

[Collective labor agreement in an enterprise]Kollektivnyi do-
govor na predpriatii. Moskva, Profizdat, 1961. 61 p. (Bib-
liotekha profsoiuznogo aktivista, no.24) (MIRA 16:3)
(Collective labor agreements)

SOLOV'YEV, V.G.

Some problems of the origin and characteristics of polymetallic deposits.
Trudy VSEGEI no.2:25-41 '50.
(MLR 6:6)
(Ores)

SOM, TYPN, Vol.

Characteristics of erythropoiesis in leukemia in children.
Vop. genet. v pediat. no.3:276-283 '64.
(MIR 18:7)

L 14500-65 EWT(m) DIAAP/AFNL/SSD/ESD(t)
ACCESSION NR: AP4048632

S/0048/64/028/010/1599/1616

AUTHOR: Solov'yev, V.G.; Fogel', P.; Korneychuk, A.A.

19

TITLE: Investigation of octupole states of strongly deformed even-even nuclei ^{Report} _{Re-}
Fourteenth Annual Conference on Nuclear Spectroscopy held in Tbilisi 14-22
Feb 1964

SOURCE: AN SSSR. Izv. Seriya fizicheskaya, v.28, no.10, 1964, 1599-1616

TOPIC TAGS: nuclear physics, nuclear model, nuclear structure, excited state

ABSTRACT: This paper presents a systematic theoretical investigation of the energies and structures of the octupole excited states with $\lambda = 3$ and $\mu = 0, 1, 2, 3$ in strongly deformed even-even nuclei. The calculations are performed on the basis of the superfluid model by the method of approximate second quantization. The derived secular equation is simplified on the assumption that the three octupole-octupole interaction constants (for the pp, nn, and pn interactions) are equal. Calculations were performed for the even-even nuclei with mass numbers between 150 and 190, and between 228 and 254. Nilsson wave functions were employed, with the deformation parameter δ assumed to have the same value 0.3 for all the nuclei in the lighter

1/3

L 14500-65
ACCESSION NR: AP4048632

group, and the value 0.2 for those in the heavier group. The octupole-octupole interaction was also assumed to be constant within each of these two groups; the interaction constant was so chosen as to give the best agreement with the experimental energies of the 0^+ states. The first two roots of the secular equation were calculated for the $0^+, 1^-, 2^-,$ and 3^+ states, and the energy values, together with the energies of the first and second bands and the corresponding experimental data (when available) are presented graphically. The calculated values of the energies of the lowest $1^-, 2^-,$ and 3^+ states agree well with the experimental values, provided the effect of blocking is taken into account when it is important. The octupole-octupole interactions are usually important for 1^- and 2^- states, and are usually negligible for 3^+ states. The structures of the octupole states are illustrated by tabulating the contributions of the various two-quasiparticle states for a number of selected nuclei. In most nuclei the lowest 0^+ state is strongly collectivized, whereas the 1^- and 2^- states may be collectivized but are usually rather close to two-quasiparticle states. The 3^+ states may be regarded as two-quasiparticle states with less than 1% admixture of other than the principal state. Reduced electromagnetic transition probabilities were calculated, and a future paper is promised in which these will be discussed. "In conclusion, we express our gratitude to N.N.Bogolyubov for an interesting discussion of the article, and to K.M.

2/3

L 14500-65
ACCESSION NR: AP4048632

3

Zheleznova, L.V. Korneychuk and G. Yungklaussen for assistance in performing the numerical calculations. Orig.art.has: 19 formulas, 9 figures and 13 tables.

ASSOCIATION: none

SUBMITTED: 00

ENCL: 00

SUB CODE: NP

NR REF Sov: 004

OTHER: 006

3/3

L 14490-65 EWT(m) DIAAP/AFWL/SSD/ESD(t)

ACCESSION NR: AP4048633

S/0048/64/028/010/1617/1630

AUTHOR: Pyatov, N. I.; Solov'yev, V. G.

B

TITLE: Energies of the excited states of some strongly deformed even-even nuclei with mass numbers between 164 and 190 Report, Fourteenth Annual Conference on Nuclear Spectroscopy held in Tbilisi 14-22 Feb 1964 *19*

SOURCE: AN SSSR. Izv. Seriya fizicheskaya, v.28, no.10, 1964, 1617-1630

TOPIC TAGS: nuclear physics, nuclear model, nuclear structure, excited state

ABSTRACT: The energies of a number (averaging 19 per nucleus) of non-rotational states of each of the following even-even nuclei were calculated on the basis of the superfluid model with blocking taken into account and the results are tabulated: Dy¹⁶⁴, Er¹⁶⁴, Yb¹⁶⁸, Yb¹⁷⁴, Yb¹⁷⁶, Hf¹⁷⁶, W¹⁸⁴ and Os¹⁸⁶. The structures of states containing more than 5% admixture are shown in tables. Beta-transitions to levels of four of the above nuclei were analyzed and the results of the analysis are included in the respective tables. The same system of average field levels was employed for all the calculations, i.e., it was assumed that the nuclei are all equally deformed. The level system employed is very similar to that given by S.Nilsson and O.

1/2

L 14490-65

ACCESSION NR: AP4048633

Prior (Mat.-fys.Medd.Danske Vid.Selskab.32,16,1960) but has been slightly altered to take account of more recent data concerning the single-particle levels of odd nuclei. The parameters employed in the calculations are tabulated. Many features of the results are discussed in detail, and a number of previously proposed assignments are questioned. Since superfluid model calculations of two-quasiparticle excitation energies are performed separately for the neutron and proton systems, it is possible to obtain the energies of two-quasiparticle excited states of all nuclei with $00 \leq N \leq 110$ and $62 \leq Z \leq 76$ from the results of this paper together with previously published data (C.J.Gallagher and V.G.Soloviev, Mat.-fys.Skr.Danske Vid.Selskab.2, No.2,1962; N.I.Pyatov and V.G.Solov'yev, Izv.AN SSSR,Ser.fiz.24,11,1964). Orig.art. has: 2 formulas, 2 figures and 11 tables.

ASSOCIATION: Laboratoriya teoreticheskoy fiziki Ob'yedinnennogo instituta yadernykh issledovaniy (Theoretical Physics Laboratory, Joint Institute for Nuclear Research)

SUBMITTED: OO

ENCL: OO

SUB CODE: NP

NR REF Sov: 009

OTHER: 016

2/2

ACCESSION NR: AP4042397

S/0056/64/047/001/0252/0261

AUTHOR: Liu, Yuan; Solov'yev, V. G.; Korneychuk, A. A.

TITLE: Energy of quadrupole states of strongly deformed even-even nuclei

SOURCE: Zh. eksper. i teor. fiz., v. 47, no. 1, 1964, 252-261

TOPIC TAGS: beta vibrational state energy, gamma vibrational state energy, dysprosium gamma vibrational state, erbium gamma vibrational state, dysprosium beta vibrational state, erbium beta vibrational state, strongly deformed nucleus, erbium, dysprosium

ABSTRACT: The energies of beta- and gamma-vibrational states of even-even strongly deformed nuclei for $152 \leq A \leq 186$ and $228 \leq A \leq 254$ have been calculated. A satisfactory agreement was found between the calculated and corresponding experimental data for a case when $\kappa_n = \kappa_p = \kappa_{pp} = \kappa$, where $\kappa = 10 A^{-4/3} \hbar \omega^0$ in the first region and $\kappa = 12 A^{-4/3} \hbar \omega$ in the second region. In accordance with experimental data for isotopes Dy and Er, the energies of gamma-vibrational were found to be lower than energies of beta-vibrational states. It was

Card 1/2

ACCESSION NR: AP4010752

S/0020/64/154/001/0072/0075

AUTHORS: Solov'yev, V.G.; Fogel', P.; Korneychuk, A.M.

TITLE: Energies of octupole collective states with $I \neq K = 0$
even-even strongly deformed nuclei

SOURCE: AN SSSR. Doklady*, v. 154, no. 1, 1964, 72-75

TOPIC TAGS: energy, octupole collective state, deformed nucleus,
superfluid model, excitation state

ABSTRACT: Research based on approximate second quantization was conducted on properties of atomic nuclei. Results were realized in the area of spherical nuclei where energy states and probability of electromagnetic transitions were computed. It was found that research in the area of strongly deformed nuclei is limited, but basic equations are cited and the question of excluding the heated state is studied. Based on the method of approximate second quantization in limits of superfluid models of the nucleus, energies were calculated for octupole collective states with $I \neq K = 0$ of even-even

Card 1/2

ACCESSION NR: AP4010752

strongly deformed nuclei in areas of $152 \leq A \leq 186$ and $228 \leq A \leq 254$. The behavior of collective octupole state energy with $K\pi = 0$ is explained by introducing one new constant Π ; all remaining parameters are specified earlier. Microscopic treatment of the state based on the superfluid model of the nucleus differs strongly from the phenomenological treatment of the unified model of the nucleus. According to the treatment of the superfluid nucleus model, the octupole states in single nuclei are relatively low (lower than β and Γ of vibration states), and possess clearly expressed collective properties, but in other nuclei such states have high energy values and are inherently similar to quasi-particle excitation states. "In conclusion we are deeply grateful to academician N.N. Bogolyubov for interesting discussions and to G. Yunklaussen for his help in conducting numerical calculations." Orig. art. has: 2 figures.

ASSOCIATION: Ob'yedinenny*y institut yaderny*kh issledovaniy
(Joint Institute for Nuclear Research)

SUBMITTED: 06Jul63

DATE ACQ: 10Feb64

ENCL: 00

SUB CODE: PH

NO REF SCV: 004

OTHER: 009

Card 2/2

L 17689-65 EWT(m) DIAAP/SSD/AFWL/ESD(t)

ACCESSION NR: AP4049482

S/0020/64/159/002/0310/0313

AUTHORS: Solov'yev, V. G.

TITLE: Structure of excited states with $K \pi = 2+$ even-even
deformed nuclei 19 B

SOURCE: AN SSSR. Doklady*, v. 159, no. 2, 1964, 310-313

TOPIC TAGS: even even nucleus, excited state, nuclear physics,
nuclear spin, nuclear structure

ABSTRACT: This is a continuation of earlier work by the author
(with Liu Yuan and A. A. Korneychuk, ZhETF v. 47, no. 1, 252, 1964),
and is devoted to the calculation of the energy of the two lowest
states with angular momentum projection on the symmetry axis equal
to 2, and with positive parity, of even-even nuclei in the mass-
number ranges from 150 to 190 and 228 to 254. The properties of
these states are investigated with allowance for blocking, and the

Card 1/2

L 17689-65

ACCESSION NR: AP4049482

5

relation between the collective and two-quasiparticle structure as studied. A unified description is obtained, within the framework of the superfluid model of the nucleus, for the two-quasiparticle and collective nonrotational states of deformed even-even nuclei. It is shown that the average field of the nucleus determines which of the lowest states with $K = 2$ are collective, and which are two-quasiparticle ones. "In conclusion I thank N. N. Bogolyubov and P. Fogel' for interesting discussions, and A. A. Korneychuk and G. Yungklaузен for the numerical calculations." This report was presented by N. N. Bogolyubov. Orig. art. has: 2 figures, 1 formula, and 1 table.

ASSOCIATION: Ob"yedinenny*y institut yaderny*kh issledovaniy
(Joint Institute of Nuclear Research)

SUBMITTED: 22May63

ENCL: 00

SUB CODE: NP

NR REF SOV: 001

OTHER: 004

Card 2/2

SOLOV'YEV, V.G., doktor fiz.-matem. nauk

Structure of the atomic nucleus. Priroda 54 no.3:32-36
(MIRA 18:4)
Mr '65.

1. Ob"yedinennyi institut yadernykh issledovaniy, Dubna.

ACC NR: A7005442

SOURCE CODE: UR/0367/66/001/003/0528/0536

AUTHOR: Kulov, L. A.; Polikanov, S. M.; Solov'yev, V. G.
ORG: Joint Institute for Nuclear Research (Ob'yedinennyj institut yadernykh issledovaniy)
TITLE: Structure of spontaneously fissionable isomers
SOURCE: Yadernaya fizika, v. 4, no. 3, 1966, 528-536
TOPIC TAGS: isomer, excited state, isotope
ABSTRACT: Excited states with equilibrium deformations δ_1 higher than the ground state equilibrium deformations δ_0 of the corresponding nuclei are investigated. Isomers with $\delta_1 > \delta_0$ are considered and it is shown that isomers of a number of odd-odd Pa, Np, Am, and Bk isotopes can exist having life-times which with respect to spontaneous fission, are shorter or of the same order as those with respect to γ -transitions. The energies of such isomers are calculated and nuclei are shown in which the occurrence of spontaneously fissile isomers is most probable. It is asserted that previously discovered, spontaneously fissile isomers are two-quasi-particle excited states with $K\pi = 12^-, p_{505}\uparrow n_{606}\uparrow$, and $K\pi = 11^-$, $p_{505}\uparrow n_{615}\uparrow$, with the equilibrium deformation $\delta_1 = 0.32$. It is shown that the probability of finding spontaneously fissile isomers in odd and even-even nuclei is very small. The authors thank G. N. Flerov, A. Sobichevskiy, V. M. Strutinskiy and P. Fogel for interesting discussions. A. Giorza contributed to work with the isomers. Orig. art. has: 2 figures, 1 formula and 1 table. [JFM: 38, 761]
SUB CODE: 20 / SUBM DATE: 22Jan66 / ORIG REF: 014 / OTH REF: 011

0966 0317

SULOV'YEV, V.

USSR

1236. Radiative correction to the lifetime of the π^0 meson. A. D. GALANIN AND V. O. SOLOV'YEV. Letter in *Zh. ekspер. teor. fiz.*, 27, No. 1(7) 112-14 (1954) In Russian.

An alternative method is given for deriving the additional term L' in the Lagrangean corresponding to a ps. scalar meson-nucleon interaction [compare Abstr. 2014 (1950), 5082 (1951)]. Using Feynman's method the radiative correction is worked out. The lifetime becomes $\tau^{-1} \sim \pi^{-2} (g^2/\hbar c) (e^2/\hbar c)^2 (\mu/m)^4 (\mu c^2/\hbar) [1 + (7/4\pi)(g^2/\hbar c)]$, where μ = meson, m = nucleon mass.

W. J. SWIATECKI *BS*

USSR/Nuclear Physics - Pi mesons collisions with nucleons

FD-2878

Card 1/2 Pub. 146 - 15/26

Author : Solov'yev, V. G.

Title : Letter to the editor. Bremsstrahlung during collisions of pi-mesons with nucleons

Periodical : Zhur. eksp. i teor. fiz., 29, August 1955, 242-245

Abstract : The present communication is based on work completed in 1952 in the Institute of Nuclear Problems, Academy of Sciences USSR (V. G. Solov'yev, Otchet IYaP AN SSSR, February 1952). Bremsstrahlung during scattering of mesons on nucleons, which radiation occurs in virtue of Coulomb interaction, was calculated by R. Christya and S. Kusaka (Phys. Rev., 59, 414, 1941); however, because of the strong interaction of mesons with nucleons the main role is played by bremsstrahlung on nuclear forces. The authors, therefore, in the present note calculate the cross section of the process of radiation of gamma quanta during scattering of pseudoscalar pi-mesons on nucleons at nuclear forces both for pseudoscalar and also for pseudoscalar bonds of mesons with nucleons. They carry out the calculations in the third order of the theory of perturbations in nonrelativistic approximation

Card 2/2

FD-2878

for nucleons. They investigate the results of calculations of the cross section of the process $\pi^- + p \rightarrow \pi^- + p + \gamma$ separately for the case of pseudoscalar and pseudovector bonds. They thank Prof. I. Ya. Pomeranchuk and I. M. Shmushkevich for their guidance. Five references: e.g. V. Berestetskiy, I. Shmushkevich, *ibid.* 1951.

Institution : Institute of Nuclear Problems. Acad. Sci. USSR

Submitted : Apr 18, 1955

SOLOV'YEV, V. G.

SOLOV'YEV, V. G.: "The construction of Green's approximate functions
in the pseudoscalar meson theory." Moscow Order of
Lenin State University M. V. Lomonosov, Moscow, 1956.
(DISSERTATION FOR THE DEGREE OF CANDIDATE IN PHYSI-
COMATHEMATICAL SCIENCES).

Knizhnaya letopis
No. 35, 1956. Moscow.

SOLOV'EV, V. G.

✓ Solov'ev, V. G. On a certain model in the quantum theory of fields. *Dokl. Akad. Nauk SSSR (N.S.)* 108 (1956), 1041-1044. (Russian)

1-FW

✓ The author proposes a model of a quantum field theory of interaction of a somewhat different type from those studied previously. [A model is by definition a theory which satisfies some but not all of the requirements one would impose on a relativistic quantum theory of fields. See, e.g., T. D. Lee, *Phys. Rev. (2)* 95 (1954), 1329-1334; MR 16, 317, and G. Källén and W. Pauli, *Danske Vid. Selsk. Mat. Fys. Medd.* 30 (1955), no. 7; MR 17, 927.] He writes down a history-integral for the nucleon Green function in neutral pseudo-scalar meson-theory with pseudo-scalar coupling. He then calculates it approximately using the double limit technique of Abrikosov and Halatnikov [*Dokl. Akad. Nauk SSSR (N.S.)* 103 (1955), 993-996; MR 17, 565] and the assumption that the limiting meson momentum is zero and the limiting nucleon momentum infinity. The model referred to in the title is obtained by regarding this approximation procedure as defining a theory in which the procedure is exact. After renormalization, the nucleon Green's function of the model satisfies all the general requirements imposed by positive definiteness of the scalar product and relativistic invariance. [J. S. Wrighton (Princeton, N.J.).]

✓ 2
1-4/ed

SOLOV'EV, V. G.

SUBJECT USSR / PHYSICS
AUTHOR SOLOV'EV V.G.
TITLE On a Model in the Quantum Theory of Fields.
PERIODICAL Dokl. Akad. Nauk, 108, 1041-1044 (1956)
Publ. 6 / 1956 reviewed 9 / 1956

CARD 1 / 2

PA - 1240

The model investigated here may be derived from the two-limit technique (A.A.ABRIKOSOV, I.M.CHALATNIKOV, Dokl. Akad. Nauk, 103, 933 (1955)) by putting the boundary momentum λ_{meson} of the meson equal to zero and making the boundary momentum λ_{nucleon} of the nucleon tend towards infinity. In this model the equation for the GREEN'S function of the nucleon can be rigorously solved. The here investigated interaction of pseudoscalar neutral mesons with nucleons is characterized by the LAGRANGIAN $L(x) = g\bar{\psi}(x)\gamma_5\psi(x)\varphi(x) + M(x)$ where $M(x)$ depends only on the operators of the meson field $\varphi(x)$. $M(x)$ may contain a term with "classical source" $I(x)\varphi(x)$ and also counterterms for renormalization.

GREEN'S function of the nucleon is here ascertained by means of the formulae by N.N.BOGOLJUBOV, Dokl.Akad.Nauk, 99, 255 (1954). On this occasion the GREEN'S function $G(x,y)$ is expressed by the GREEN'S function $G(x,y|\varphi)$ of a nucleon in the classical field φ and then transformed for momentum representation. In $M(x)$ only the counterterms for renormalization are left over.

In the example studied λ_{φ} is equal to zero and λ_{ψ} tends towards infinity. At first an expression for the approximated GREEN'S function $G(k|0)$ of the nucleon

SOLOV'YEV, V.G. SOLOV'YEV, V.G.

SUBJECT USSR / PHYSICS
 AUTHOR SOLOV'EV, V.G.
 TITLE The Function of the Extension of the Nucleon in Quadratic
 Approximation.
 PERIODICAL Dokl. Akad. Nauk, 111, fasc. 3, 578-581 (1956)
 Issued: 1 / 1957

CARD 1 / 2

PA - 1796

The present work investigates GREEN'S function in the pseudoscalar symmetric meson theory with pseudoscalar coupling in consideration of the mathematical side of the problem. It explains the basis of the new method for the construction of approximated GREEN'S functions in quadratic approximation. This method is destined to be applied within the domain of low energies. The present work determines the function of the extension of the nucleon $G(k|0)$ as well as the summit parts $\Gamma_5^>(k;q)$ and $\Gamma_\mu(k;q)$ in quadratic approximation. $\Gamma_\mu(k;q)$ is here made use of for the purpose of acquiring knowledge concerning the magnetic moment of the nucleon.

Because of the very complicated nature of the equations for GREEN'S functions only the linear equations for GREEN'S functions are investigated here, i.e. all closed nucleon-antinucleon loops are here neglected. It is shown that FEYNMAN'S conclusion as to a considerable influence exercised by pairs applies only to the domain $k^2 \gg m^2$. The GREEN'S function of the nucleon $G(x,y|0)$ is connected with the GREEN'S function $G_{kl}(x,y|\varphi)$ of the nucleon in the classical field φ in case

Dokl. Akad. Nauk, 111, fasc. 3, 578-581 (1956) CARD 2 / 2

PA - 1796

of a neglect of the polarization of the vacuum as follows:

 $G(x, y|0) = \langle T \{ G_{kl}(x, y|q) \} \rangle_B$, i.e. by averaging the T-product ofG_{kl}(x, y|q) over the boson vacuum. By making use of the translation of the nuclei of the functionals the equation for G_{kl}(k|q) is written down as fol-lows: $[m - \int_{\mu} k_{\mu} - \int dp \int_{\mu} p_{\mu} q^{\lambda}(p) \frac{\delta}{\delta q^{\lambda}(p)} - \bar{g} \gamma_5 \tau^{\lambda} \int dp q^{\lambda}(p)] G_{kl}(k|q) = 1$ Here $\bar{g} = g/(2\pi)^2$ and m denote the mass of the nucleon. Instead of the usualmatrices of the isotopic spin τ^{λ} the matrices defined by the relation $g^{\lambda} \tau^{\lambda} q^{\lambda} = g \tau^{\lambda} q^{\lambda}$ are used. It is then true that: $G_{kl}(k|q) = [m + \int_{\mu} k_{\mu} + \int dp \int_{\mu} p_{\mu} q^{\lambda}(p) \frac{\delta}{\delta q^{\lambda}(p)} + \bar{g} \gamma_5 \tau^{\lambda} \int dp q^{\lambda}(p)] G_{kl}(k|q) = 1$ Next, the equation for G_{kl}(k|q) is given. As this equation cannot be accurately solved, a simplified solution is used, on which occasion the recoil- and the interference term are neglected. The solution of the functional equation is here expressed by a function which satisfies a nonlinear equation. The solution of this equation, in turn, is represented by the solution of a FRED-

HOLM integral equation of the second kind. Finally, G(k|0) is obtained in form of an integral over the determinant of a FREDHOLM integral equation with four

independent variables. -Next, the summit parts γ_5 and τ^{λ} are explicitly given,

their computation entails even greater mathematical difficulties.

INSTITUTION: Institute for Nuclear Problems of the Academy of Science in the USSR.

56-5-14/55

AUTHOR

SOLOV'YEV, V.G.

TITLE

Investigation of a Model in the Quantum Theory of the Field.
 (Issledovaniye odnoy modeli v kvantovoy teorii polya. - Russian)
 Zhurnal Eksperim. i Teoret. Fiziki 1957, Vol 32, Nr 5,
 pp 1050 - 1057 (USSR)

PERIODICAL

In the model investigated in the paper under review, the equation for the Green's function of the fermion can be rigorously solved.

The nature of the model: The author investigates the interaction of pseudoscalar (for reasons of simplicity, neutral) bosons with fermions. The Lagrangian of this interaction reads

$$L(x) = g: \Psi(x) \gamma_5 \Psi(x) : \varphi(x) + M(x).$$

In this context, $M(x)$ depends on the operators of the boson field $\varphi(x)$, and it can contain both a term with a small "classical source" $J(x)\varphi(x)$ as well as counterterms for the renormalization. In the model under consideration, the classical boson field does not depend on the coordinates. In the sense of the two-boundary-value technique employed by Abrikosov and Khalatnikov, the model investigated in the paper under review corresponds to the following case: The boundary impulse of the boson φ

CARD 1/3

56-5-14/55

Investigation of a Model in the Quantum Theory of the Field.

equals zero and the boundary impulse of the fermion λ tends towards ∞ . In the paper under review, the Green's function of the fermion is determined with the aid of formulae devised by Bogolyubov. In the model under consideration the boson is, so to say, smeared over the entire x -space, whereas the fermion is viewed as punctiform. It is possible to view the expressions for the Green's function of the fermion as obtained in the paper under review as a certain approximate Green's function of the nucleon of the quantum theory of the field, if we have in the first approximation $\varphi(x) = \text{const}$.

The one-particle approximation is reduced in the way of expression of the Feynmann diagrams to the neglecting of the closed fermion loops. In this approximation, the Green's function $G(k)$ is connected in a very simple way with the Green's function $G_{kl}(k; \varphi)$ of a fermion in the classical field φ .

The exact Green's function of the fermion: It is possible to find the exact Green's function of the fermion for the model under discussion, without neglecting a single Feynmann diagram. The author of the paper under review first of all investigates the nonrenormalized Green's function $G(k)$. The renormalization is

CARD 2/3

46-5-14/55

Investigation of a Model in the Quantum Theory of the Field.

accomplished in two stages. The model discussed in the paper under review permits to conceive a mental picture of the behaviour of the Green's function of the nucleon of the pseudoscalar meson theory in the domain $k^2 \gg m^2$, i.e. far from the pole

$$k^2 = m^2.$$

(No reproduction)

ASSOCIATION: Institute for Nuclear Problems, Academy of Sciences of the USSR
PRESENTED BY: -
SUBMITTED: 13.5. 1956
AVAILABLE: Library of Congress.

CARD 3/3

Solov'yev, V.G.

56-2-36/47

AUTHOR

Solov'yev, V.G.

TITLE

On the Conservation of Combined Parity.
(O sokhranenii kombinirovannoy chetnosti.)

PERIODICAL

Zhurnal Ekperim. i. Teoret. Fiziki, 1957, Vol. 33, Nr 2(8),
pp. 537-538 (USSR)

ABSTRACT

The author develops and investigates the following hypothesis: When constructing the Lagrangian of the strong, electromagnetic, and the weak interaction of the elementary particles, invariance with respect to the operators IC and T must be demanded, i.e. only the conservation of the combined parity. In certain cases the conservation of combined parity leads to the conservation of spatial parity, but in other cases spatial parity is not conserved. The Lagrangian of interaction, which is invariant with respect to the operation IC , can be written down in the following form: $L = L_1 + L_2$, where L_1 is invariant with respect to spatial reflection, and L_2 is responsible for the conservation of the parity I . The author here contents himself with studying the strong and the electromagnetic interaction, in which case the connection between spin and statistics is assumed to be known. The here obtained

CARD 1/2

56-2-36/47

On the Conservation of Combined Parity.

renormalized and gradient-invariant Lagrangian of interaction of the nucleon field with the electromagnetic field and with the particles with spin zero is here explicitly written down; it is invariant with respect to operation IC. Here two additional vertices occur. In the case of quantum electrodynamics invariance with respect to the operation IC, because of the gradient invariance, automatically leads to invariance with respect to I and C separately, i.e. to the conservation of spatial parity. However, in the meson theory terms occur which lead to the non-conservation of I, which, in principle, offers a possibility of experimentally re-examining the hypothesis developed here. There is no figure and 1 Slavic reference.

ASSOCIATION: United Institute for Nuclear Research.
(Ob'yedinennyj institut yadernykh issledovaniy.)

SUBMITTED: May, 17, 1957.

AVAILABLE: Library of Congress.

CARD 2/2

SOLOV'YEV, V. G.

56-3-39/59

AUTHOR:

Solov'yev, V.G.

TITLE:

On the Lagrangian of the Interaction Between K-Mesons and Hyperons (O lagrannzhiane vzaimodeystviya K-mezonov i giperonov)
(Letter to the Editor)

PERIODICAL:

Zhurnal Eksperim. i Teoret. Fiziki, 1957, Vol. 33, Nr 3 (9),
pp. 796 - 797 (USSR)

ABSTRACT:

The present paper investigates the conclusions of the hypothesis relating to the interaction between K-mesons and hyperons that in all interactions only combined parity is conserved. J. Schwinger proposed the existence of a strong $K-\bar{K}'$ - interaction for the explanation of the experimental facts. He succeeded in the constructing the Lagrangian of this interaction on the assumption that the K-mesons have no fixed parity. The hypothesis of the conservation of only the combined parity leads to the following Lagrangian of the strong $K-\bar{K}'$ -interactions:

$L_{K\bar{K}'} = ig_{K\bar{K}'} \{ K^* K_o \bar{\Phi} - K K_o^* \bar{\Phi}^* \}$. Here K , K_o and $\bar{\Phi}$ denote the operators of the K-fields and the pion field. This Lagrangian is not invariant with respect to the rotations of the isotopic spin within space. Thus the local Lagrangian of the direct

Card 1/2

On the Lagrangian of the Interaction Between K-Mesons and Hyperons 56-3-39/59

K- \bar{N} -interaction (which is invariant with respect to the operation IC) cannot be written down in isotopic-invariant form. A. Salam (Nuclear Phys., 1956, Vol. 2, p.173) with respect to the operations I, C, T, succeeded in finding an invariant Lagrangian of strong interaction between nucleons and hyperons with K-mesons and pions. With respect to the operation IC the author here constructs an invariant addition L' to this Lagrangian, where I and C remain unseparated. The renormalizable interactions in which I and C remain unseparated, can be written down in charge-invariant form, if they only contain certain vertexes given here. There 4 references, 1 of which is Slavic.

ASSOCIATION: United Institute for Nuclear Research
(Ob"yedinennyi institut yadernykh issledovaniy)

SUBMITTED: June 8, 1957

AVAILABLE: Library of Congress

Card 2/2

AUTHOR: Solov'yev, V.G. 56-5-22/46

TITLE: An Equation for Green's Functions of a System of Fundamental Particles (Uravneniya dlya funktsiy Grina sistemy fundamental'nykh chastits)

PERIODICAL: Zhurnal Eksperim. i Teoret. Fiziki, 1957, Vol. 33, Nr 5, pp. 1215-1220 (USSR)

ABSTRACT: The entire system of equations of Green's function for fundamental particles is derived theoretically. On the basis of the Lagrange representation, which describes all strong interactions of the mesons and barions, closed systems of equation for Green's function are obtained in variations dependent on the exterior current, viz. for the threedimensional as also for the fourdimensional space of the isotopic spin. There are 6 references, 1 of which is Slavic.

ASSOCIATION: United Nuclear Research Institute (Ob'yedinennyi institut yadernykh issledovaniy)

SUBMITTED: May 3, 1957

AVAILABLE: Library of Congress

Card 1/1

SOLOV'YEV, V. G.

Laboratory of Theoretical Physics. Joint Inst. Nuclear Research, Dubna, USSR

"The Hypothesis of Conservation of Combined Parity only in Strong, Electromagnetic and Weak Interactions," Nuclear Physics, 6, No. 4, 1958. Amsterdam.

abst: The hypothesis is considered that only combined parity I_C is conserved in strong, electromagnetic and weak interactions. It is demonstrated that the ~~hypothesis~~ hypothesis is not inconsistent with available experimental data. However, more precise polarization experiments are required for a proof that the hypothesis is correct. It is shown that gauge invariance in quantum electrodynamics and isobaric invariance in pseudoscalar meson theory lead to invariance of renormalizable interaction Lagrangians under space reflection I . Renormalizable and isobarically-invariant Lagrangians for the interaction between K-mesons and baryons are obtained which are invariant under the operation I_C but not under the operation I .

AUTHOR:

Solov'yev, V. G.

SOV/56-34-5-44/61

TITLE:

Two Classes of Interaction Lagrangians (Dva klassa Lagranzhianov vzaimodeystviya)

PERIODICAL:

Zhurnal eksperimental'noy i teoreticheskoy fiziki, 1958,
Vol. 34, Nr. 5, pp. 1339 - 1336 (USSR)

ABSTRACT:

The author investigates the Lagrangians of the strong interactions of baryons and mesons which maintain their isotopic structure. (A. Salam, Ref 1). The wave functions of particles which belong to one and the same isotope multiplet in all transformations behave in a similar way. The Lagrangians of the strong interaction are subdivided into two classes. Those interactions belong to the first class which contain at least one vertex, where the fermion changes none of its main characteristics (mass, electric charge, strangeness). This includes the electromagnetic interaction, the interactions of the pions with the nucleons, of the pions with the Ξ -hyperons and of the pions with the Ξ -hyperons. To the second class belong such interactions which contain only such vertices at which the fermion alters at least

Card 1/3

Two Classes of Interaction Lagrangians

SOV/56-34 5-29/61

one of its main properties. These interactions are the interaction of pions with $\bar{\Lambda}$ - and Σ -hyperons and all interactions of the Kaons with baryons. The interaction Lagrangians have, for different given fields with the spin 0, different forms which are not reducible into each other. (They are written down). The interaction Lagrangians of the second class describe the interactions of bosons with fermions which in the case of certain given operators have the same phase factors. Thus two types of Lagrangians of the second kind exist; the type of the interaction is determined by the behaviour of the operator of the boson field. For the interaction of the second class a combination of the scalar and of the vectorial coupling is possible. There is only one form of the Lagrangians of the second class, which with regard to an inversion of the time is invariant, as can be seen:

$L = i(\bar{\psi}_1 \gamma_5 \psi_2 \phi + \bar{\psi}_2 \gamma_5 \psi_1 \phi^*) + i\bar{\phi}(\bar{\psi}_1 \psi_2 \phi - \bar{\psi}_2 \psi_1 \phi^*)$. The gradient terms are omitted. The Lagrangians of the interaction of baryons and mesons, which belong to the first class, are completely determined. For the interactions of the second class only one form exists. Therefore the isotope-invariant Lagrangian

Cart 2/3

Two Classes of Interaction Lagrangians

SOV/56-34-5-48/61

of the strong interaction of the baryons and mesons, which with regard to a time inversion is invariant, is defined uniquely. There are 4 references, 2 of which are Soviet.

ASSOCIATION: Ob"yedinennyj institut yadernyh issledovaniy (United Institute of Nuclear Research)

SUMMITED: January 24, 1958

1. Particles--Properties 2. Particles--Mathematical analysis
3. Particles--Electromagnetic factors

Card 3/3

Barbante, R., Dr. Yoshida, T. I.,
Gattinger, L. T.,
Scheifer, V. J.
Secondary Nuclear Reactions in Plutonium and Uranium During
Bombardment by Protons of High Energy (Plutonium
produced in reactor & irradiated by bombardment; plutonium
available on request)
Journal of Experimental Nuclear Reactions (Tokai, 1956),
Vol. 12, No. 12, p. 63 (1956).

ARTICLES:
In the present paper experiments are described which had
already been carried out in 1951 - 1952, the results
and conclusions of which are, however, published only
now. At (6.2) and Pe(2.5) the bombardment with protons
of energies of from 100 to 1000 MeV, and activation factors
(λ_{eff}) were obtained for various nuclides. From these activation
factors, by a mathematical method, various activation
factors were also obtained from 1000
to 2000 MeV. At 1000 MeV the same results were obtained
from bombardment with protons of 1000 MeV.

PERIODICALS:
Journal of Experimental Nuclear Reactions (Tokai, 1956),
Vol. 12, No. 12, p. 63 (1956).

At 2000 MeV, 2.192 MeV, the λ_{eff} obtained for plutonium nearly all
concentrations, $\lambda_{eff}(1.0) = 7$ min, $\lambda_{eff}(2.0) = 25$ min,
 $\lambda_{eff}(4.0) = 25$ min, $\lambda_{eff}(8.0) = 2.5$ hr, $\lambda_{eff}(16.0) =$
 $2.5 = 2$ hr, $\lambda_{eff}(32.0) = 6.5$ hr, $\lambda_{eff}(64.0) = 5.5$ hr, $\lambda_{eff}(128.0) =$
 4.2 hr, $\lambda_{eff}(256.0) = 6.5$ hr (for the continuity of λ_{eff} of
2000 MeV to 1000 MeV). The plutonium production cross sections
are also given in the table. The authors concluded them to be
as complete as the present state of the technique of
obtaining products of λ_{eff} and λ_{eff} . The production
cross sections of plutonium isotopes might be explained by the
capture of high-energy protons with a facilitated mechanism
of a compound nucleus. The cross sections
for the production of λ_{eff} are given in the table. The production
cross sections of plutonium isotopes were determined to be
from the neutron field measurements (13 to 1000 MeV)
(Ferrill and Gottschall (Ref. 1) obtained 1000 MeV)
(Ferrill and Gottschall (Ref. 2) obtained 1000 MeV)
(in connection with the production of plutonium and uran-233).

Information on activation of various nuclides
is wanted for their activation studies.
Information is wanted for their activation studies.
There are 2 figures, 4 tables, and 13 references, 2 of
which are Soviet.

February 20, 1956

SEARCHED:

Case 2/3

21(1),21(7)

AUTHOR:

Solov'yev, V. G.

SOV/20-123-3-15/54

TITLE:

On the Possibility of the Appearance of the Superfluid State of Nuclear Matter When Taking Into Account the p-p and of the n-n-Interactions (O vozmozhnosti pojavleniya sverkhtekuchego sostoyaniya yadernoy materii v sluchaye ucheta p-p- i n-n-vzaimodeystviy)

PERIODICAL:

Doklady Akademii nauk SSSR, 1958, Vol 123, Nr 3, pp 437-439
(USSR)

ABSTRACT:

This paper deals with the deduction of the conditions which must be satisfied by the potential of proton-proton interaction if there is a superfluid state of nuclear matter. The author investigates only proton-proton interactions (The p-p-interactions are assumed to be equal to the n-n-interactions) and neutron-proton-interactions are not taken into account. This case is obviously the most interesting one for the transition from nuclear matter to a finite nucleus. The author investigates only that part of the Hamiltonian of interaction which is responsible for the appearing of the superfluid state of nuclear matter. The following model Hamiltonian is explicitly given:

Card 1/3

On the Possibility of the Appearance of the
Superfluid State of Nuclear Matter When Taking Into Account the
p-p- and of the n-n-Interactions

SOV/20-123-3-15/54

$$H = \sum_k \{E(k) - E_F\} a_{k+}^+ a_{k+} + \frac{1}{V} \sum_{k, k'} J(k, k') a_{k+}^+ a_{-k-}^+ a_{-k'} a_{k'}^+$$

V denotes the volume of the system; E_F - a parameter which plays the role of the chemical potential and which, in the normal state, is equal to the energy of the Fermi surface;

a_{k+}^+ , a_{k+} - the operators of creation and absorption of a proton. The signs \pm characterize the direction of the spin.

According to N. N. Bogolyubov (Ref 2), the nuclear matter is in the superfluid state if the equations

$$2|E(k) - E_F| \Psi(k) + \frac{1}{V} \sum_k J(k, k') \Psi(k') = E \Psi(k)$$

have solutions with negative eigenvalues $E = -2\delta$, $\delta > 0$. The author investigates the asymptotic solutions of these equations for the case in which $J(k, k')$ together with E approaches zero. An approximate equation is then investigated and

Card 2/3

21(7)

SOV/56-35-3-50/61

AUTHOR:

Solov'yev, V. G.

TITLE:

On the Interaction of Nucleons Which Lead to the Occurrence
of a Super-Fluid State of an Atomic Nucleus (O vzaimodeyst-
viyakh nuklonov, privodyashchikh k pojavleniyu sverkhtekuchego
sostoyaniya atomnogo yadra)

PERIODICAL:

Zhurnal eksperimental'noy i teoreticheskoy fiziki, 1958,
Vol 35, Nr 3, pp 823- 825 (USSR)

ABSTRACT:

The present paper deals with the occurrence of super-fluid
states in medium- and heavy nuclei. These states are with re-
spect to energy more favorable than the states of a complete-
ly degenerated Fermi-gas (normal state). The author for this
purpose used the variation principle of Bogolyubov (Ref 1)
and the mathematical methods developed in the theory of super-
conductivity (Ref 3). Bogolyubov's variation principle is
a generalization of the well-known method developed by Fok
(Ref 2). By making use of the shell model of nuclei the
author investigates the weak interaction of the protons (or
neutrons) on one and the same shell with equal or inverse
values of the projection of the moment m on to the symmetry

Card 1/3

SOV/56-35-3-53/61

On the Interaction of Nucleons Which Lead to the Occurrence of a Super-Fluid State of an Atomic Nucleus

axis of the nucleus. The Hamiltonian corresponding to this model is written down and explained. Next, the mean value $\bar{H} = \langle C_0^* H C_0 \rangle$ with respect to the new vacuum $a_{m1} C_0 = a_{m0} C_0 = 0$ is determined. One then obtains equations for the "new" unknown function $C_m(s)$. In conclusion, the difference ΔE between the first excited state and the super-fluid ground state and the difference ΔE between the super-fluid and the normal state are calculated. According to these calculations, the super-liquid state is, with respect to energy, more favorable and is separated from the normal state by a gap. The interactions between the protons on one and the same shell and equal and opposed projections of the moment lead to the occurrence of a super-fluid state of the atomic nucleus. The author thanks N. N. Bogolyubov, Academician, for the constant interest he displayed in this work as well as for his most valuable comments. There are 5 references, 4 of which are Soviet.

Card 2/3

SOV/56-35-3-53/61

On the Interaction of Nucleons Which Lead to the Occurrence of a Super-Fluid State of an Atomic Nucleus

ASSOCIATION: Ob"yedinenyyi institut yadernykh issledovaniy
(United Institute of Nuclear Research)

SUBMITTED: July 29, 1958

Card 3/3

S7/21-123-4-21/53

On the Formation of the Superfluid State of an Atomic Nucleus

determined with respect to the new vacuum state ϕ_0 . The course of calculation is followed step by step: the following result is obtained: for the purpose of determining the asymptotic behavior of the superfluid state of the atomic nucleus from the total interaction of the protons located in one and the same shell, only a small part is essential. Only interactions of protons with inversely equal projections of the angular momentum Q to a symmetry axis of the nucleus are of essential importance. The remaining part of proton interaction on the shell must be considered on the basis of the perturbation theory. The present paper confirms the correctness of a previous paper (Ref 6) by the same author, according to which it is possible to explain the energy gap between the ground state and the first one-particle excited state in heavy even-even nuclei by means of the superfluid state of the atomic nucleus. In the case of odd nuclei there is no energy gap, and in the case of excitation, transitions within the external shell will probably be observed. The author thanks Academician F. I. Bogoliubov for his valuable advice. There are 6 references, 5 of which are Soviet.

Card 2/3

SOV/20-123-4-31/53

On the Formation of the Superfluid State of an Atomic Nucleus

ASSOCIATION: Ob'yedinenyyi institut vadernykh issledovaniy
(Joint Institute for Nuclear Research)

PRESENTED: July 20, 1958, by N. N. Bogolyubov, Academician

SUBMITTED: July 17, 1958

Card 3/3

Solov'yei, V.G.

SOLOV'YEV, V. G.

"On the Superfluid State of the Atomic Nucleus."

Nuclear Physics, Vol. 9, No. 4, 1959, 655-664. (No. Holland Publ. Co. Amsterdam)

Lab. of Theoretical Physics, Joint Inst. of Nuclear Research, Dubna, USSR

The variation principle proposed by N. N. Bogolubov and the mathematical methods developed in the theory of superconductivity are employed to study the properties of the atomic nucleus. Weak interactions between protons (or neutrons) located in the same shell are treated on the basis of a nuclear model in which nucleons of the closed internal shells are assumed to produce a centrally symmetrical field which is somewhat distorted by nucleons in the outer shell. It is shown that the interaction between protons in an outer shell give rise to a superfluid state of the nucleus, the main role being played by interactions between protons with equal and opposite projections of the angular momenta on the nuclear symmetry axis. The energy of the ground superfluid state and first excited state is evaluated and it is shown that in the case of an even number of protons in the shell, an energy gap between the superfluid and first excited states should exist, whereas no such gap exists if the number of protons is odd. This permits one to explain the energy gap in heavy even nuclei. Conditions for the appearance of a superfluid state in an atomic nucleus have been obtained. They reduce to the requirement that attractive forces predominate between interacting protons located in the same shell near the Fermi surface energy. The critical temperature for the phase transition of the nucleus from the superfluid to normal state has been determined.

21(8)
AUTHOR:Solov'yev, V. G.

SOV/56-36-1-42/62

TITLE:

The Conditions of the Superfluidity of an Atomic Nucleus
and the Temperature of Phase Transition (Usloviya
sverkhtekuchesti atomnogo yadra i temperatura fazovogo
perekhoda)

PERIODICAL:

Zhurnal eksperimental'noy i teoreticheskoy fiziki, 1959,
Vol 36, Nr 1, pp 293-294 (USSR)

ABSTRACT:

By means of a variation principle suggested by Bogolyubov (Ref 2), (which is a generalization of his statistical variation principle), the author determines the conditions for the occurrence of the superfluid state of the atomic nucleus and the temperature of the phase transition from the superfluid to the normal state. According to these deliberations, the energy of the normal state has no minimum as long as an equation, which is given here, has solutions with negative eigenvalues. That is also the reason why a superfluid state occurs. Like in the case of the Fermi-systems of a metal (Ref 4) or in nuclear matter (Ref 5), the superfluidity conditions are reduced to the postulate that the attractive forces predominate in the energy of the Fermi-surface. The

Card 1/3

The Conditions of the Superfluidity of an Atomic Nucleus and the Temperature of Phase Transition

80V/56-36-1-42/62

condition of superfluidity is given as $J(s_0|m_0, m_0) < 0$.

(The denotations used in the present paper have apparently already been defined in one of the author's earlier papers (Ref 1). The attractive forces must therefore predominate between the protons on the external shell. A condition is then written down for the case in which, at a temperature Θ that is different from zero, a superfluid state of the atomic nucleus exists. In transition from the superfluid to the normal phase at the critical temperature Θ_0 , the eigenvalue of energy

must become equal to zero. Finally, an equation for the determination of the critical energy and an expression for the temperature of the phase-transition are given. The author thanks Academician N. N. Bogolyubov for his constant interest in this work and for his useful comments. There are 5 Soviet references.

ASSOCIATION: Ob"yedinennyi institut yadernykh issledovaniy (United Institute for Nuclear Research)

Card 2/3

SOV/56-36-2-49/63

21(7), 24(5)

AUTHOR:

Solov'yev, V. G.

TITLE:

On the Verification of the Conservation of Parity in Strong
Interactions (K voprosu o proverke sokhraneniya chetnosti v
sil'nykh vzaimodeystviyakh)

PERIODICAL:

Zhurnal eksperimental'noy i teoreticheskoy fiziki, 1959,
Vol 36, Nr 2, pp 628-629 (USSR)

ABSTRACT:

When analysing the problem of parity conservation in the individual interactions, the author assumes the following: 1) The law of conservation of combined parity describes the fundamental properties of space-time and is a fundamental law of symmetry in nature. 2) The conservation of spatial parity in the individual interactions is a consequence of additional invariance conditions. In the case of quantum electrodynamics, the condition of invariance with respect to the operation of combined inversion PC (or reflection with respect to the time T) leads to invariance with respect to the spatial inversion P. This conclusion may be drawn also in the pseudoscalar meson theory. The condition of invariance (with respect to a transformation of PC) of the renormalized and isotopically invariant

Card 1/3

SOV/56-36-2-49/63

On the Verification of the Conservation of Parity in Strong Interactions

Lagrangian of the interaction of K-mesons and baryons does not lead to an invariance with respect to the operation P . In this connection it is interesting to find out whether parity is conserved or not in the processes of production of K-mesons and hyperons. If isotopic invariance is not disturbed, the non-conservation of parity in nucleon-nucleon collisions and in nuclear reactions can be considered to be caused by the participation of virtual K-mesons and hyperons and also by the non-renormalizability (nonlocality) of interaction. The author investigates the process $\pi + N \rightarrow K + Y$ with following decay $Y \rightarrow N + \pi$ (Y may be a Λ -particle or a Σ -hyperon). If parity is not conserved in the production of a K-meson or hyperon, a longitudinal component of the polarization vector of the hyperon appears and this causes an asymmetry of the distribution of the pions produced in the decay of hyperons. It would be interesting to investigate this process in a narrow angular interval of hyperon production. At high pion energies, processes with 3 and more particles in the final state will be more probable. In this case, the reaction $\pi^- + p \rightarrow \Sigma^- + K^+ + \pi^0$ is very inter-

Card 2/3

SOV/56-36-2-49/63

On the Verification of the Conservation of Parity in Strong Interactions

esting. If parity is not conserved in the production of hyperons and K-mesons, an asymmetry appears in the distribution of the K-mesons with respect to the plane through the direction of the incident pion and the direction of the Σ -hyperon. This reaction is very advantageous for the evaluation of experimental data. The advantage of this and similar

reactions ($K^- + d \rightarrow \Lambda + p + \pi^-$, $\pi^- + p \rightarrow \Sigma^0 + K^+ + \pi^-$) consists in the following: Asymmetry does not depend on the properties of longitudinal polarization, and a large complex of experimental data at any angle of hyperon production can be taken into account. There are 5 references, 3 of which are Soviet.

ASSOCIATION: Ob"yedinennyj institut yadernykh issledovaniy (United Institute of Nuclear Research)

SUBMITTED: October 27, 1958

Card 3/3

21(1), 24(5)

AUTHOR:

Solov'yev, V. G.

SOV/56-36-6-34/65

TITLE:

Investigation of the Superfluid State of the Atomic Nucleus
(Issledovaniye superkhukuchego sostoyaniya atomnogo yadra)

PERIODICAL:

Zhurnal eksperimental'noy i teoreticheskoy fiziki, 1959, Vol 36,
Nr 6, pp 1869 - 1874 (USSR)

ABSTRACT:

In the introduction several papers dealing with the superconductivity theory and the investigation of nuclear matter are mentioned. S. T. Belyayev and the author of the present paper (Refs 5 - 7) investigated the connection between nucleon interaction and the superfluid state of the nucleus on the basis of the shell model. These investigations are continued in the present paper. It is the main aim of this work to calculate the excited states of the shells both in the case of an even and of an odd number of nucleons, and to carry out a stability investigation of the nuclear isobaric lines with respect to β -decay. By using the variation principle of N. N. Bogolyubov and the physical ideas and mathematical methods of the superconductivity theory the properties of heavy nuclei are investigated. On the basis of the nuclear shell model the author investigates the residual interactions between the nucleons located on the external shell,

Card 1/2

Investigation of the Superfluid State of the Atomic Nucleus Sov/56-36-6-34/66

which lead to the occurrence of the superfluid state of the nucleus. The energy of the superfluid ground state and of a series of excited states is calculated. Several rules in the spectrum of the levels of even-even nuclei and of nuclei with odd A are pointed out. The energy variations in the ground state of the nucleus when the number of nucleons in the external shell is varied by unity is also calculated. It may be concluded from the results obtained that even-even nuclei are stable with respect to β -decay as compared to odd-odd nuclei. The results obtained are in quantitative agreement with the semi-empirical Weizsäcker formula. The results obtained for an idealized nuclear model depend to a slight degree on the nature of the nuclear model and apply also in the case of considerably deformed nuclei. The author finally thanks N. N. Bogolyubov and D. P. Zaretskiy for interesting discussions. There are 10 references, 9 of which are Soviet.

ASSOCIATION:

Ob"yedinennyi institut yadernykh issledovaniy (Joint Institute of Nuclear Research)

SUBMITTED:
Card 2/2

January 3, 1959

24 (5)

AUTHOR:

Solov'yev, V. G.

SOV/53-68-1-12/17

TITLE:

The Conservation of the Combined Parity as Fundamental Law of Symmetry in Nature (Sokhraneniye kombinirovannoy chetnosti kak osnovnoy zakon simmetrii v prirode)

PERIODICAL:

Uspekhi fizicheskikh nauk, 1959, Vol 68, Nr 1, pp 159-163 (USSR)

ABSTRACT:

This article is the reproduction of a lecture delivered by the author on the quantum-field theory and the theory of elementary particles at the All-Union Interuniversity Conference at Uzhgorod on October 3, 1958. In the introduction the basic connections between the properties of the space-time continuum and the fundamental physical laws are discussed (space-time homogeneity; energy-impulse-angular momentum-conservation laws; special theory of relativity, space-time reflection properties; Lorenz invariance of physical laws). Lee and Yang have shown that in the case of weak interaction the spatial parity is not conserved. The resultant problem of the space-time symmetry properties is then discussed. Landau, Lee, and Yang (Refs 2, 5), therefore, assumed in the case of weak interaction that the combined parity is conserved; Landau formulated that in such a way that the spatial parity should

Card 1/4

SOV/53-68-1-12/17

The Conservation of the Combined Parity as
Fundamental Law of Symmetry in Nature

be conserved, while the asymmetry property is contained in the particle itself, strictly speaking, it is conditioned by its electric charge. It results from the non-conservation of parity in the case of weak interaction that the space-time continuum exhibits no symmetry with respect to the reflection of the spatial axes; the postulate is assumed that the law of conservation of the combined parity follows the fundamental law of symmetry in nature, i.e. any theory whatever must be invariant with respect to transformations of the combined reversal. This was primarily formulated as the hypothesis of the conservation of the combined parity in strong, electromagnetic, and weak interaction (see Zel'dovich, Refs 8 and 3, 4). A PC-transformation consists in the reversal of the spatial coordinates (P-transformation) and in the transition from the particle to the anti-particle (C). According to Pauli-Lüders it follows that quantities which are invariant with respect to the combined reversal, are also invariant with respect to a reversal of the time axis. As a result, this new law can also be formulated as a law of

Card 2/4

SOV/53-68-1-12/17

The Conservation of the Combined Parity as
Fundamental Law of Symmetry in Nature

The author then discusses the problem of the conservation of parity in the case of strong interaction. The Lagrangians of this interaction may be divided into two classes (interaction between pions and nucleons and pions and Σ hyperons; interaction between pions and Λ - and Σ -hyperons and all interactions between K-mesons and baryons). It is underlined that the law of the conservation of combined parity is a fundamental property of the conservation of continuum; the conservation of parity in a few reactions of interaction is due to an additional postulate of invariance. In the pseudoscalar or scalar meson theory, the conservation of parity results from the condition of isotopic invariance. These relations are then discussed. In the investigation of the non-conservation of parity in the case of strong interaction (baryon-meson collision analysis) it results that this effect is due to the non-conservation of parity of the share of virtual weak interaction. In conclusion, the author discusses problems of the experimental realization of the conservation of parity in the case of strong interaction (investigations of asymmetry in various meson-proton reactions)

Card 3/4

The Conservation of the Combined Parity as
Fundamental Law of Symmetry in Nature

SOV/53-68-1-12/17

and explains a number of Western articles. There are 21
references, 9 of which are Soviet.

Card 4/4

24(5)
AUTHORS:Bogolyubov, N. N., Academician,
Solov'yev, V. G.

SOV/20-124-5-14/62

TITLE:

On a Variation Principle in the Many-body Problem
(Ob odnom variatsionnom printsipe v probleme mnogikh tel)

PERIODICAL:

Doklady Akademii nauk SSSR, 1959, Vol 124, Nr 5.
pp 1011-1014 (USSR)

ABSTRACT:

N. N. Bogolyubov (Ref 1) suggested a new variation principle, which is a generalization of the known method developed by V. A. Fok (Ref 2). Investigation of this new variation principle was then continued by S. V. Tyablikov (Refs 4, 7). The present paper contains a report on further investigations of the variation principle in the many-body problem: The authors determine equations for the steadiness in explicit form and investigate the application of this variation principle to 2 special cases. They investigated a system of interacting Fermi-particles with the Hamiltonian

$$H = \sum_{f,f'} E(f',f) a_{f,f'}^\dagger a_{f,f'} + \frac{1}{2} \sum_{f_1,f_2,f'_1,f'_2} K(f'_2, f'_1; f_1, f_2) a_{f_1}^\dagger a_{f_2}^\dagger a_{f'_2} a_{f'_1} .$$

Here it holds that $E(f',f) = T(f',f) - \lambda \delta_{f,f'} \quad \text{the}$

Card 1/2

On a Variation Principle in the Many-body Problem

SOV/20-124-5-14/62

chemical potential, f - the totality of indices characterizing the state of this particle. For the real function it holds that $K(f'_2, f'_1; f'_1, f'_2) = K(f_2, f_1, f'_1, f'_2) = K(f'_1, f'_2; f_2, f_1)$. Next, a canonical transformation of Fermi-amplitudes is carried out and the mean value of H with respect to this state is defined. Calculation is followed step by step. In conclusion, the authors speak about the application of the new variation principle to 2 special cases of the many-body problem. There are 7 Soviet references.

ASSOCIATION: Ob"yedinenyyi institut yadernykh issledovaniy (United Institute for Nuclear Research)

SUBMITTED: December 1, 1958

Card 2/2

SOV/20-126-4-18/62

24(5)

AUTHOR:

Solov'yev, V. G.

TITLE:

An Equation for the Wave Function of a System of N Particles
in the Many-body Problem (Uravneniye dlya volnovoy funktsii
sistemy N chaitits v zadache mnogikh tel)

PERIODICAL:

Doklady Akademii nauk SSSR, 1959, Vol 126, Nr 4,
pp 755 - 758 (USSR)

ABSTRACT:

In the present paper an equation for the wave function of a system of N particles in the many-body problem is developed according to the variation principle introduced by N. N. Bogolyubov (a generalization of Fok's method), in which the correlation of an arbitrary number of particles is taken into account. With equation (1) the Hamiltonian for a system of interacting Fermi particles is given. In the equations (2) and (3) relations are given by means of the new variation principle worked out by the author together with his collaborators in a previous paper (Ref 5), from which, in the following, the correlation function is deduced. This correlation function is obtained in form of equation (8), and with the help of the latter the wave function for a system of N particles is ob-

Card 1/ 2

An Equation for the Wave Function of a System of N
Particles in the Many-body Problem

SOV/20-126-4-18/62

tained in form of equation (10). As an example, these wave
functions are finally developed for the many-body problem in
the case of two particles for the steady and for the non steady
case. The author finally thanks N.N. Bogolyubov for his inter-
est in this investigation and for his valuable advice. There
are 6 references, 5 of which are Soviet.

ASSOCIATION: Ob"yedinennyi institut yadernykh issledovaniy (Joint Institute
of Nuclear Research)

PRESENTED: February 28, 1959, by N. N. Bogolyubov, Academician

SUBMITTED: February 14, 1959

Card 2/2

24(5) 24.4500, 24.6900
AUTHOR: Solov'yev, V. G.

66472
Sov/40-129-1-18/64

TITLE: Examination of the Conservation of Parity in Strong Interactions at High Energies

PERIODICAL: Doklady Akademii nauk SSSR, 1959, Vol 129, Nr 1,
pp 68 - 71 (USSR)

ABSTRACT: The present paper investigates such processes, which have N particles in their final states ($N > 3$). The author investigates, which asymmetries of the distribution of the produced particles indicate the non-conservation of parity in strong interactions, and in which reactions and between which particles the occurrence of such symmetries is more probable. Further, the author determines those cases, in which the asymmetry, caused by the hyperon decay, indicates the non-conservation of parity in strong interactions. A reaction of the type $a+b \rightarrow c_1 + c_2 + \dots + c_N$ is analyzed, in which N particles are present in its final state. Any spins of the particles may be assumed. A formula for the cross section of this process is written down. In case, the parity is not conserved in strong interactions, asymmetries are bound to occur with

Card 1/4

66472

Examination of the Conservation of Parity in Strong SOV/20-129-1-18/64
Interactions at High Energies

respect to any of the planes, which pass through the direction of the momentum of the incoming particle, and through the direction of the momentum of an arbitrary, but completely defined final particle. The author then investigates the problem, for which processes and, relatively to the distribution of which particles asymmetries may be expected, which refer to the non-conservation of parity in strong interactions. Basing on the reflections upon the special importance of K-meson-hyperon interactions, the occurrence of the searched asymmetries has to be expected in the distribution of those baryons and mesons, which contain strange particles. For instance, the occurrence of asymmetries in the reactions

$\pi^- + d \rightarrow \Delta^0 + K^- + p$, $\pi^- + p \rightarrow \Lambda^0 + K^0 + (N'\pi)$, $\pi^- + p \rightarrow \Sigma^+ + K^+ + (N'\pi)$ is little probable. $(N'\pi)$ denotes the arbitrary number of such pions, for which the complete electric charge equals 0. The occurrence of these asymmetries (which correspond to non-conservation of parity) in the distribution of those n final particles ($2 \leq n \leq N-1$) is more likely, if the distribution of $(n-1)$ arbitrary particles of them is forbidden by the laws

Card 2/4

66472

Examination of the Conservation of Parity in Strong SOV/20-129-1-16/64
Interactions at High Energies

of conservation and by the laws of parity (or also by the laws of the number of baryons or of the electric charge). The generation of n such particles presents a coherent entity and no particles exist between them, which are additionally generated by peripheral interactions. The reactions

$\pi^- + p \rightarrow \underline{\Sigma^0} + K^0 + \pi^+ + (N^0 \pi^0)$, $\pi^- + p \rightarrow \underline{\Lambda^0} + K^+ + \pi^- + (N^0 \pi^0)$, $\pi^- + p \rightarrow \underline{n^+} + K^0 + \pi^- + (N^0 \pi^0)$, $\pi^- + p \rightarrow \underline{\bar{\Lambda}^0} + p + n + K^- + (N^0 \pi^0)$, $\pi^+ + p \rightarrow \underline{\Lambda^0} + K^+ + \pi^+ + (N^0 \pi^0)$
 $K^- + p \rightarrow \underline{K^-} + n + \pi^+ + (N^0 \pi^0)$, $K^+ p \rightarrow \underline{\Lambda^0} + K^+ + (N^0 \pi^0)$, $p + p \rightarrow \underline{\Lambda^0} + K^+$
 $+ p + (N^0 \pi^0)$, $p + p \rightarrow \underline{\Sigma^0} + K^0 + p + (N^0 \pi^0)$, $p + p \rightarrow p + \pi^+ + n + (N^0 \pi^0)$ are of great interest with respect to the conservation of parity in strong interactions. The underlined terms represent the entity of these 3 or 4 terms, if the generation of 2 or 3 of them is forbidden by the laws of conservation. Also those reactions are mentioned, in which the quantum numbers, introduced by A. Pais (Ref 6) are not conserved. The observation of the non-conservation of parity in strong interactions of the original presumptions, confirms and permits a more exact analysis of different phenomena: Selective modifications in the

Card 3/4

4

56472

Examination of the Conservation of Parity in Strong Sov/20-129-1-18/64
Interactions at High Energies

systematology of primary (unit) particles, verification of the hypothesis of charge invariance, interpretation of the influence exercised by K-meson-hyperon forces within the field of nuclear forces, etc. There are 6 references, 3 of which are Soviet.

ASSOCIATION: Ob"yedinennyi institut yadernykh issledovaniy (Joint Institute of Nuclear Research)

PRESENTED: June 29, 1959, by N. N. Bogolyubov, Academician

SUBMITTED: June 15, 1959

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Card 4/4

SOLOV'EV, V.G.; TEN GYN

On an application of the statistical variational principle to the
theory of the atomic nucleus. Acta phys Hung 11 no.3:277-283 '60.
(ERAI 9:10)

1. Ob"edinennyi institut yadernykh issledovaniy, Laboratoriya
teoreticheskoy fiziki, Dubna, SSSR. Predstavleno K.Novobacki.
(Nuclear physics)

82426

S/056/60/038/03/27/033
B006/B014

24.6520

AUTHORS: Belyayev, V. B., Zakhar'yev, B. N., Solov'yev, V. G.TITLE: Superfluidity of Light Nuclei /9PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, 1960,
Vol. 38, No. 3, pp. 952-954

TEXT: In the article under review, the authors made use of the physical ideas and mathematical methods of the theory of superconductivity to study the properties of light nuclei on the basis of the shell model. The nuclei of the range $22 \leq A \leq 32$ were selected as suited to the method. The residual interactions of protons and neutrons in the outer shell are studied. The most essential differences of these interactions in light nuclei as compared to heavy nuclei lies in the existence of neutron-proton interactions in addition to the pp- and nn interactions. The state of a nucleon is characterized by the quantum numbers s , m , and σ ($\sigma = \pm 1$ the sign of the projection (m) of the momentum onto the symmetry axis of the nucleus). The Hamiltonian of residual interactions between the nucleons within the range of Fermi surface energy $E_p - \delta E(s, m) + E_p + \Delta$ is

Card 1/3

X

Superfluidity of Light Nuclei

0242
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given by (1) in an isotopic-symmetric form. The relations, which are first derived in a general manner, are discussed in the approximation $J = \text{const}$ and $\varphi = \text{const}$. It was found that (in the model under consideration) the residual np-, pp-, and nn interactions (after separation of the self-consistent field) produce a superfluid state of the nucleus. The ground-state energy of an even nucleus does not depend on the type of pairing (pp, nn, or pn) of the nucleons. The first excited state in light even-even (or odd-odd-with $Z = N$) nuclei is separated from the ground state by an energy gap of the order 2ϵ . For the purpose of explaining the energy levels and the binding energies of the nuclei under consideration it is necessary to take into account the quadruple correlations of nucleons (α -particles) in addition to the pair correlations. The authors' assumption that np, pp, and nn pair correlations with equal quantum numbers s and m exist, which lead to the superfluid state of light nuclei was confirmed by data (Ref. 2) on the binding energy of the last neutron in light nuclei. Finally, the authors thank N. N. Bogolyubov for his highly interesting discussion. There are 4 references, 3 of which are Soviet.

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Card 2/3

Superfluidity of Light Nuclei

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ASSOCIATION: Ob"yedinennyi institut yadernykh issledovaniy (Joint
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SUBMITTED: October 12, 1959

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Card 3/3

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AUTHOR: Solov'yev, V. G.

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B013/B011TITLE: Quadruple Correlations in Light Nuclei *7*PERIODICAL: Doklady Akademii nauk SSSR, 1960, Vol 131, Nr 2, pp 286 - 289 (USSR)

ABSTRACT: The present paper deals with interactions leading to the formation of quadruple correlations of nucleons of the type of an α -particle. Pair and quadruple correlations are used to investigate certain rules governing the binding energies of the last neutrons in light nuclei. Quadruple correlations disappear if there are more neutrons than protons. This also explains the absence of α -particle properties in nuclei with a mass number of over 40. The author investigates the possibility of the occurrence of correlations and their properties on the strength of the shell model of the nucleus. Moreover, he investigates the interactions of nucleons, which are left after the deduction of the self-consistent field. These nucleons are situated in the outer shell of a light nucleus. The strong mutual interaction of the nucleons situated in the nucleus in the S-state, allows the formation of pair correlations and quadruple correlations. This permits the selection of such an interaction Hamiltonian as takes into account solely the interactions of nucleons with equal quantum numbers s, m . The quadruple correlations of the nucleons are

Card 1/3

Quadruple Correlations in Light Nuclei

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S/020/60/131/02/019/071
B013/B011

regarded as an interaction of the nucleon pairs. Different pairs may originate with isotopic invariance: either from neutron and proton in the states (s, cm) , or from two protons (neutrons) in the states (s, m) and $(s, -m)$. Next, the model Hamiltonian for the interaction between the pairs in the case of isotopic invariance is written down. The possibility of the occurrence of quadruple correlations is investigated by means of a variation principle suggested by N. N. Bogolyubov. Operators of quasi-pairs also occur. The formation of quadruple correlations is said to be favorable from the energetic point of view. The author then investigates the influence of quadruple correlations (together with the pair correlations of the nucleons) on the binding energy of the last neutron in light nuclei. Data concerning the binding energy of the last neutron in nuclei confirms the author's assumption that pair correlations and quadruple correlations exist in light nuclei. The formation of quadruple correlations with a neutron excess is unfavorable for neutrons and protons from the energetic point of view because of the separation of the Fermi planes. These two properties effect a quick disappearance of the α -particle properties in nuclei with $A > 40$, where $N > Z$ holds for all stable nuclei. The author thanks N. N. Bogolyubov for his continuous interest and for ✓

Card 2/3

Quadruple Correlations in Light Nuclei

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S/020/60/131/02/019/071
B013/B011

valuable remarks, as well as B. S. Dzhelepov for his interesting discussions. There are 6 Soviet references.

ASSOCIATION: Ob"yedinennyi Institut yadernykh issledovaniy (Joint Institute of Nuclear Research)

PRESENTED: November 18, 1959, by N. N. Bogolyubov, Academician

SUBMITTED: November 12, 1959

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Card 3/3

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AUTHOR: Solov'yev, V. G.

TITLE: A Superfluid Model of the Nucleus *19*

PERIODICAL: Doklady Akademii nauk SSSR, 1960, Vol. 133, No. 2,
pp. 325-328

TEXT: By way of introduction, the author refers to the mathematical methods developed by N. N. Bogolyubov in the theory of superfluidity and superconductivity. It is stated that the basic state of a medium or heavy nucleus can be aptly regarded as a superfluid state of the nucleus. The prerequisites are listed, which a nucleus must satisfy in order to be described by a superfluid model. As the first stage in the investigations of this model, the author examined strongly deformed nuclei, and restricted himself to nuclei of the rare earths. By the aid of the variation principle by Bogolyubov (Ref. 1) he obtains the energy of the ground state of the even shell in the form of equation (3). Equation (6) is given for an odd shell. The values of the constants C and λ occurring

Card 1/3

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A Superfluid Model of the Nucleus

S/020/60/133/02/20/068
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in (3) and (6) are compiled for five different interaction constants G , namely, these values hold for a deformation of $\delta = 0.26$. Table 2 shows that the values calculated here offer a better description of the excitation spectrum, than such as are obtained by Nilsson's scheme (Ref. 4). Moreover, a strong influence of G is found and the residual interaction does not lead to any change in the ground state. On calculating the excited states of even-even nuclei the author obtained spin values and parities which are very probable. The coupling energy was calculated after formula (9), and a few respective data are given. The values thus obtained are for a $G = (0.13 - 0.18)$ Mev at $(93 \leq N \leq 115)$ and for a $G = (0.15 - 0.20)$ Mev at $(63 \leq Z \leq 76)$ in the range of experimental results. Finally, the author deals with the calculation of the correction of the probabilities of β - and γ -transition. The author points to the usability of the model given here for the calculation of a series of properties of strongly deformed nuclei, and finally thanks N. N. Bogolyubov for his interesting discussions and I. N. Silin for his numerical computations. There are 4 tables and 4 references: 1 Soviet, 1 American, and 2 Danish.

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Card 2/3